Chapter 5

© Mass Wildlife

Resources

Lake Contacts

Executive Office of Environmental Affairs (EOEA)
251 Causeway Street – 9th Floor, Boston, MA 02114 Phone: 1-617-626-1000
www.state.ma.us/envir
- ***Coastal Zone Management (CZM)***
  www.mass.gov/czm
  Phone 617-626-1200

Massachusetts Department of Conservation and Recreation (DCR)
251 Causeway Street, Suite 600 Boston, MA 02114 Phone: 1-617-626-1250
www.mass.gov/dcr
- ***Lakes and Ponds Program***
  www.mass.gov/lakesandponds
  Phone 1-617-626-1382

Massachusetts Department of Environmental Protection (DEP)
1 Winter Street, Boston, MA 02108
Phone: 617-292-5500
www.state.ma.us/dep

Massachusetts Division of Fish and Game
251 Causeway Street Suite 400, Boston, MA 02114 Phone:1-617-626-1500
www.ma.gov/dfwele/dpt_toc.htm
- ***Division of Fisheries and Wildlife***
  1 Rabbit Hill Rd., Westboro, MA 01581
  Phone: 1-508-792-7270
  www.mass.gov/dfwele/dfwldfw_toc.htm
- ***Natural Heritage & Endangered Species***
  Program www.state.ma.us/dfwele/dfw/nhesp
  Phone: 508-792-7270 x200
- ***MassWildlife***
  www.state.ma.us/dfwele/dfw/dfw_toc.htm
  Phone: 617-626-1590

U.S. Environmental Protection Agency (EPA)
EPA New England Region 1
1 Congress Street Suite 1100 Boston, MA 02114-2023 Phone:1-888-372-7341
1-800-424-8802 (emergency number)
www.epa.gov/OW/index.html

North American Lake Management Society (NALMS)
P.O. Box 5443 Madison, WI 53705-5443
Phone:1-608-233-2836
www.nalms.org

Massachusetts Congress of Lakes and Ponds (COLAP)
135 Washington Street, Holliston, MA 01746
Phone:1-800-845-2769
www.colap.com

Lakes and Ponds Association of Western Massachusetts (LAPA-WEST)
C/O Hampton Ponds State Park 1048 North Road, Westfield MA 01085
LAPAWEST@aol.com

Massachusetts Water Watch Partnership
Blaisdell House- University of Massachusetts
Box 30820 Amherst, MA 01003-0820
Phone:1-413-545-5531
www.umass.edu/tei/mwwp/

State Publications

Brochures

Lawns & Landscapes in Your Watershed (DEP)
TMDL's: Another Step to Cleaner Waters (DEP)
Don't Trash the Grass (DEP)
Invasive Plants (DCR)
Shoreline Surveys: Action Tool (DEP)
Clean Rivers Begin at Home: A Guide to Understanding Nonpoint Pollution (DEP)
Protect Your Pet and Preserve the Environment: Don't Release Exotic Species! (CZM)

Manuals and Guides

- Guide to Selected Invasive Non-native Aquatic Species in Massachusetts (DCR)
- Guide to Aquatic Plants in Massachusetts (DCR)
- Final Generic Environmental Impact Report (GEIR) on Eutrophication and Aquatic Plant Management in Massachusetts (DCR)
- The Practical Guide to Lake Management in Massachusetts (A Companion to the Final Generic Environmental Impact Report on Eutrophication and Aquatic Plant Management in Massachusetts)(DCR)
- Nonpoint Source Management Manual: A Guidance Document for Municipal Officials (DEP)
- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas: A Guide for Planers, Designers, and Municipal Officials (DEP)
- Volume I: Stormwater Policy Handbook (DEP)
- Volume II: Stormwater Technical Handbook (DEP)
- A Guide to Lakes and Ponds in Massachusetts Forests and Parks
- Surveying a Lake Watershed and Preparing an Action Plan (DEP)
- Give Your Lake the Blues! (DEP)
- Shoreline Buffer Guide (BCRP + DEP)
- More than Just a Yard (EOEA)
- A Field Guide to the Animals of Vernal Pools (DFW)
- Critters of Massachusetts (DFW)
- Guide to the Dragonflies and Damselflies of Massachusetts (DFW)

Other

- Boat Ramp Sign "Stop the Spread of Nuisance Species" (DCR)
- Invasive Species Poster (DCR)
- Waterline (a quarterly guide to watersheds, wetlands waterways, drinking water) (DEP)
- Online Lake and Pond Maps (DFW) www.state.ma.us/dfwele/dfw/dfw_pond.htm
- Abstracts of the Fish and Wildlife Laws (DFW)
- Boat Massachusetts Your Guide to Boating Laws and Responsibilities (Environmental Police)

Additional copies of DEP Materials can be obtained by calling a Regional DEP Service Center:
Northeast (978) 661- 7677
Southeast (508) 946-2714
Central (508) 792-7683
Western (413) 755-2124
www.state.ma.us/dep

Additional copies of DCR publications/materials can be obtained from:
Department of Conservation and Recreation
www.mass.gov/lakesandponds

Additional copies of DFW publications can be obtained from:
Division of Fisheries and Wildlife
1-508-792-7270

Additional copies of Environmental Police publications, or for information on fishing and boating regulations call 1-800-632-8075 or visit www.mass.gov/dfwele/dle

Useful Lake Links

U.S Environmental Protection Agency

www.epa.gov
Envirofacts
www.epa.gov/enviro/index.html
Surf Your Watershed
www.epa.gov/surf
Nonpoint Source
Homepagewww.epa.gov/OWOW/NPS
TMDL Home pagewww.epa.gov/OWOW/TMDL

U.S. Department of Agriculture

Agricultural Research Service
www.ars.usda.gov
Natural Resources Conservation
Servicewww.nrcs.usda.gov

Other Sites

Environmental Information Resources
www.gwu.edu/~greenu/index2.html
National Wildlife Federation
www.nwf.org
U.S. Geological Services
www.usgs.gov
Global Rivers Environmental Education
Network www.earthforce.org/green
Washington State Lake Book
www.ecy.wa.gov/programs/wq/plants/lakes/walpa.html
Water on the Web (educational site)
wow.nrri.umn.edu/wow/under/primer/index.html
Glossary of useful words
www.nalms.org/glossary/glossary.htm

Invasive Species Sites

Center for Invasive & Aquatic Plants
aquat1.ifas.ufl.edu/welcome.html
Invasive Plant Atlas of New England
invasives.eeb.uconn.edu/ipane/
North East Aquatic Nuisance Species panel
www.northeastans.org/
USGS Non-indigenous Aquatic Species
nas.er.usgs.gov/
MA AIS Management Plan
www.state.ma.us/czm/invasivemanagementplan.htm
New England Wildflower Society
www.newfs.org
National Aquatic Nuisance Species Panel
www.protectyourwaters.net Invasive Species
www.invasivespecies.gov/profiles/main.shtml
National Sea Grant Website
www.sgnis.org

For More Information

on Benthic Organisms
www.epa.gov/bioindicators/html/dragonflies.html
on Endangered Species
www.state.ma.us/dfwele/dfw/nhesp
on Hazardous Waste Alternatives
www.metrokc.gov/hazwaste/house/cleaners.html
on Hazardous Material Facts
environment.about.com/library/weekly/blchem1.htm
on Pesticides
www.pesticides.org

Glossary

Algae: Algae are small, non-vascular (lacking roots and leaves) plants that grow in the water.

Anoxic water: Waters that contain less than 0.5 ml/l of dissolved oxygen. Most aquatic animals cannot survive with so little available oxygen.

Blue-green Algae: Although not actually true algae, they are often indicators of high phosphorus concentrations in the water. Blue-green algae have been reclassified as cyanobacteria.

Algal Bloom: An algal bloom is the burst of algae growth that can result in scum on the water surface, odor, color or taste changes and decreased oxygen in the water.

Aphotic Zone: Zone where there is insufficient light for photosynthesis, so plants cannot survive.

Benthic Communities: The diverse group of animals (including snails, leeches, and some stages of insects) that live in the lake bottom and have a major role in the decomposition of organic material.

Best Management Practices: BMP's are practices that minimize the impact from non-point source pollution including logging, storm water runoff, construction and agriculture.

Buffer: Trees, shrubs, grass and other plants that lie between a body of water and an area of development. The vegetation helps to absorb nutrients, slow storm water runoff and reduce sedimentation.

Circulation: The seasonal mixing of layers of water in lakes or ponds of adequate depth. Often referred to as spring turnover or fall turnover.

Dissolved Oxygen: (DO) Refers to the amount of free oxygen dissolved in the water. Low levels of DO can be harmful to fish and other animals.

Ecosystem: This is a spatial unit including the relationship between living things, and their abiotic environment including one another. An ecosystem can be a drop of water or the whole earth.

Erosion: The gradual removal of rock or soil particles through the actions of weather (wind, water, and ice) or human activities.

Erosion controls: Methods developed to reduce erosion during human activities. Hay bales, silt fencing, and mulching buffers are all physical barriers that help prevent erosion.

Eutrophication: The enrichment, above the natural level of a waterbody. This is the accelerated rate at which a lake ages due to human influences, which increase nutrient loading and sedimentation.

Exotic Species: An exotic species is a species that has been introduced to a region. Since the species did not originate in the area, it often does not have natural control agents (ex. disease) and may spread rapidly and disrupt the ecosystem.

Groundwater: Water that travels or is stored beneath the surface of the earth, yet occasionally discharges into lakes, streams or the ocean.

Habitat: An area where animals can find suitable shelter, food and are able to reproduce and live.

Impervious Surface: A surface, such as pavement or rooftops that limit or prevent water from entering and being filtered by the soil. These surfaces disrupt normal groundwater recharge, increase the amount and velocity of runoff, heat the runoff and alter natural hydrological flows.

Invasive Species: A species, native or non-native, that is able to spread rapidly and alter or dominate an ecosystem.

Lake: There is no real definition of a lake. Generally speaking, lakes are mixed primarily by wind action, tend to be deeper, have unlit bottom waters, rooted aquatic plant growth only in the lake's margins, and in New England, they usually become thermally stratified in the summer.

Lake Ecology: The study of the relationship between living things and the lake environment.

Limiting Nutrient: A nutrient (ex. phosphorus) that is relatively rare in the natural environment, yet is essential for plants to grow. Therefore, its availability determines the amount of plant growth.

Glossary

Limnologist: A person who studies fresh water ecology. Limnologists work on lake management, restoration, pollution control and other issues.

Littoral Zone: The area extending from the shore to the maximum depth of plant growth.

Macrophytes: Vegetation with vascular tissue; considered evolutionarily "higher" than algae.

Native Species: These are species that originated in a region and were not introduced to the region from another area. They are part of the original flora or fauna of the area.

Nonpoint Source Pollution: Pollution that enters a waterbody from a variety of sources, including storm water, wildlife influences and recreational activities. Nonpoint source pollution does not come from a specific identifiable source, such a pipe or drain.

Nutrients: Nutrients are substances, including nitrogen (N), phosphorus (P) and carbon (C) that are required for the survival of plants and animals.

Oligotrophic: A term that describes a lake that is not very productive, low in algae and nutrients, usually has clear waters and, if stratified, has adequate oxygen in the lower layer.

Pelagic Zone: describes "open waters" that do not have contact with the shore or lake bottom.

pH: pH describes the acidity of water on an exponential scale of 1-14. A range of 0-7 is acidic, 7-14 is alkaline. A pH of exactly 7.0 is neutral. Derived from a French word meaning "strength of the hydrogen."

Phosphorus: This is a nutrient that is required by all living organisms. Phosphorus is found naturally in the environment and also in fertilizers and sewage.

Photic Zone: The sunlit upper waters that extend from the surface to the point where light dims to 1% of that at the surface.

Photosynthesis: The process by which plants and some other organisms convert carbon dioxide to sugars and oxygen, using the sun's energy and chlorophyll.

Point Source: Pollution that can be traced to a specific source such as a pipe.

Respiration: The process that utilizes oxygen to convert food molecules, such as glucose, into energy, water and carbon dioxide.

Runoff: Runoff is the water from rain or melting snow that runs downward over the earth's surface. Storm water runoff is often considered a key source of nonpoint source pollution.

Secchi Disk: The Secchi disk is a simple tool used to measure water transparency. An 8" black and white disk is lowered into the water to the point where it is just visible and the depth is then recorded.

Sediment: Particles of minerals and organic soil that are carried from one place to another by wind, glaciers and flowing water.

Shoreline Erosion: The loss of soils along a shoreline into the lake. This is often accelerated by the removal of vegetation near the shore that once held soils in place.

Succession: the natural process of a lake from nutrient poor to increasingly productive and nutrient rich. Under natural conditions, this process can take thousands of years to occur.

Temperate (lake): Lakes that are located in a climate where the summers are warm and the winters relatively cool. This zone extends between the Tropic of Cancer to the Arctic Circle.

Thermocline: The zone of rapid temperature change that develops in the summer in lakes of adequate depth. The thermacline is a barrier that prevents the upper layer (epilimnion) and the lower layer (hypolimnion) from mixing.

Transparency: Describes the clarity of water. When many soils or organic particles are clouding the water, turbidity is increased and transparency decreases.

Turbidity: Describes that clarity of water. The presence of suspended matter in the water reduces transparency.

References

Text References

Davis, J., Storer, B., Zisette, R. 1995 The Washington Lake Book

Washington State Department of Ecology

EPA 1996 Guide to Environmental Issues

EPA 1985 Protecting Our Groundwater

Horne, A. J., Goldman, C.R., 1994 Limnology 2nd Ed. Mcgraw-Hill, Inc, USA

Niering, W. A. 1998 National Audubon Society Nature Guides: Wetlands Chanticleer Press, Inc., New York.

EPA Office of Wetlands, Oceans and Watersheds, Tools for watershed Protection

DEP. 2001 Surveying a Lake Watershed and Preparing an Action Plan

Department of Fisheries and Wildlife

Wisconsin Department of Natural Resources

MA DEP Drought Management Task Force

Graphic/ Illustration References:

Page 7 "Watershed Illustration" Executive Office of Environmental Affairs

Page 5 "Runoff Graph" Federal Interagency Stream Corridor Restoration Handbook

Page 6 "What Is Your Watershed?" map from Executive Office of Environmental Affairs

Page 10 "Hydraulic Cycle" from Washington State Lake Book
Washington State Department of Ecology

Page 12 "Lake Layers" illustration redrawn from Tools for Watershed Protection The Office of Wetlands, Oceans and Watersheds, U.S. Environmental Protection Agency

Page 13 "Littoral Zone of a Lake" Diagram "Managing Lakes and Reservoirs" by NALMS 2002

Page 14 "Phosphorus Budget" diagram redrawn from Tools for Watershed Protection The Office of Wetlands, Oceans and Watersheds, U.S. Environmental Protection Agency

Page 19 "Eutrophication" diagram "Managing Lakes and Reservoirs" by NALMS 2002

Pages 26 & 27 Florida Aquatic Species web site aquat1.ifas.ufl.edu/welcome.html
(line drawings of Curly-leaved Pondweed, Common Reed, Hydrilla and Water Chestnut)

Maine Department of Environmental Protection (line drawing of Variable Milfoil)

King County web site dnr.metrokc.gov/wlr/waterres/smlakes/weed.htm
(line drawings of Fanwort, Eurasian Milfoil and Purple Loosestrife)

Page 30 "Sources of Fecal Coliform" courtesy of Washington State Department of Ecology

Page 37 "Shoreline Design" The Washington State Lake Book
Washington State Department of Ecology

Fun Lake Facts

- There are approximately five million lakes in the world.
- In terms of volume, Lake Baikal, located in Siberia, Russia, is the largest freshwater lake in the world. Lake Baikal's volume is 23,600 km^3 (14,160 mi^3) compared to Lake Superior's volume of 12,100 km^3 (7260 mi^3). 20% of the Earth's freshwater, the same amount as the all five Great Lakes combined, is stored in Lake Baikal. At 5346 feet deep (1620 m), it is also the deepest lake in the world.
- In terms of surface area, the largest freshwater lake is the world is Lake Superior, with a surface area of 31,700 mi^2 (82,103 km^2).
- The world's largest saltwater lake in surface area is the Caspian Sea. The Caspian Sea is 143,200 mi^2 (370,886 km^2).
- Lying 1,300 feet beneath sea level, the Dead Sea in Jordan and Israel is the lowest lake on earth. The Dead Sea is also the saltiest waterbody on earth, having about ten times the salinity of the ocean
- Lake Titicaca in Peru is the highest navigable lake in the world. It is located 12,500 feet above sea level.
- The saltiest lake in the world, the Dead Sea in Israel, has salinity is so high that only a few species of specialized algae can survive.
- The deepest lake in the United States is the 1932 foot deep Crater Lake in Oregon. Scientists consider Crater Lake an oligotrophic lake, due to its lack of nutrients and crystal clear cool water.
- Walden Pond is the deepest pond in Massachusetts. In 1846 Henry David Thoreau measured it at its maximum depth of 102 feet. The depth of 102 feet was confirmed in a 1995 report prepared for the Department of Conservation and Recreation.
- Quabbin Reservoir (24,704 acres) and Wachusett Reservoir (4,160 acres) are the largest manmade lakes in Massachusetts.
- Assawompsett Pond (2,656 acres) in Lakeville and Middleborough, is the largest natural waterbody.
- Lake Chargoggagoggmanchauggauggagoggchaubunagungamaugg (otherwise thankfully known as Lake Webster), is the longest lake name in Massachusetts. It means “you fish on your side, I’ll fish on my side and nobody will fish in the middle.”
- A freshwater jellyfish, the exotic Appalachian Jellyfish (*Crespedocusta sowerbii*), can occasionally be found in Massachusetts.
- Large-mouth Bass is actually not native to Massachusetts. Due to a high demand for this fish as a prized game fish, it was introduced to Essex County in 1879.
- The largest freshwater fish caught in Massachusetts was a 44 lb 2 oz carp, caught in 1993 in the Connecticut River. The record holder for second place is a 35 lb Pike, caught in 1988 in South Pond, Brookfield.
- The highest waterfalls in Massachusetts are the 80 feet high twin Bish Bash Falls, located in the southwest corner of the Berkshires.
- The lakes and ponds of Massachusetts have a native carnivorous aquatic plant, Bladderwort. In addition to photosynthesis, Bladderwort has a competitive edge over other native species.

Key Contacts

1. Grant Information (page 42)

Contact the Department of Conservation and Recreation - Lakes and Ponds Program
617-626-1353 or visit www.mass.gov/lakesandponds

2. Water Quality and Use Issues

Contact the MA Department of Environmental Protection
617-292-5500 or visit www.state.ma.us/dep/dephome.htm

3. Dam Questions

Contact Department of Conservation and Recreation Office of Dam Safety
617-626-1410 or for emergencies call 1-800-831-0596
www.state.ma.us/dcr

4. Permitting and Notice of Intents

Contact your local town Conservation Commission or Wetlands Chief
www.maccweb.org

5. Herbicide Questions

Contact the Department of Environmental Protection
617-292-5500 or visit www.mass.gov/dep/dephome.htm or
Contact the Department of Agricultural Resources
617-626-1700 or visit www.mass.gov/lakesandponds

6. Lake and Pond Restoration

Contact the Department of Conservation and Recreation Lakes and Ponds Program
617-626-1395 or visit www.mass.gov/lakesandponds

7. Public Access and Great Ponds

Contact the Department of Fish and Game Public Access Board
617-727-1843 or visit www.mass.gov/dfwele/pab/pab_toc.htm

8. Fishing

Contact the Department of Fish and Game
617-626-1590 www.state.mass.gov/dfwele/dfw.dfw_toc.htm

9. Invasive Species

Contact the Department of Conservation and Recreation Lakes and Ponds Program
617-626-1382 or visit www.mass.gov/lakesandponds

10. Hazardous Materials Recycling

Contact the Department of Environmental Protection
617-292-5574 or visit www.state.mass.gov/dep/contact.htm

11. Volunteer Monitoring and Forming a Lake Association)

-Water Quality: Mass WaterWatch Partnership 413-545-5531
www.umass.edu/tei/mwwp/
-Invasive Species Monitoring: DCR Weed Watcher Program 617-626-1382
www.mass.gov/lakesandponds
-Forming a Lake Group: Congress of Lakes and Ponds (COLAP) 1-800-845-2769
www.macolap.org

12. Fishing and Boating Laws

Environmental Police 800-632-8075 www.mass.gov/dfwele/dle